THE EFFECTS OF EXTEROCEPTIVE FEEDBACK
VS INSTRUCTIONAL SETS ON CARDIAC RATE CONTROL

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Abstract

This study predicted that verbal instructions are as effective as exteroceptive feedback (i.e., visual feedback) in achieving increases and decreases in heart rate (HR). Previous research has not demonstrated conclusively that exteroceptive feedback provided an advantage to learning HR control when compared to NO feedback conditions.

The independent variables in this study were Feedback (Yes and No) Autonomic Awareness (High, Middle, Low) and Sex (Male and Female). Seventy-two Ss, 36 male and 36 female, were selected from 200 undergraduate students on the basis of scores received on the 5 questions directly related to heart rate activity on the Mandler Autonomic Perception Questionnaire (APQ). Twelve Ss, 6 males and 6 females classified as High, Middle, or Low scorers on autonomic awareness were randomly assigned to one of two feedback conditions (visual feedback and verbal instructions or No feedback and verbal instructions) constituting twelve groups of six Ss each. The apparatus used to provide visual feedback was the VITAL I, a battery powered digital display instrument that monitors and displays the human pulse rate in beats per minute.

A multivariate analysis of variance was utilized to analyze the data. None of the main effects or the interactions between them were statistically significant. There was a trend in the predicted direction when the means were inspected.

Visual inspection of the data revealed that a few individual Ss were able to increase or decrease heart rate equal to or greater than 5 beats

from the resting condition. The data also revealed that using the 5 questions related to heart rate activity to group Ss in High, Middle, and Low Awareness groups, was questionable since Ss who scored high on the questions related to heart rate did not score in the high range when the total questionnaire was considered.

The most important finding of this study was that no groups were able to produce significant increases and decreases in heart rate. Data also indicated the APQ scores and ability to control HR had no relationship. Discussion of possible design weaknesses followed.

INTRODUCTION

Since the mid-1960's an increasing number of articles dealing with operant conditioning and/or self-control of cardiac functioning have suggested that cardiovascular disorders can be treated psychologically, via use of biofeedback paradigms, as well as pharmacologically. Biofeedback as a treatment aid has been successfully employed in the treatments of essential hypertension (Shapiro, Schwartz, & Tursky, 1972; Shapiro, Tursky, & Schwartz, 1973), premature ventricular contractions (PVCS) where patients were taught to accelerate and decelerate heart rate (Weiss & Engel, 1971), and to reduce the frequency and severity of tension headaches (Budzynski, Stoyva, & Adler, 1970). All of these studies suggest that feedback has and can be useful in a clinical setting.

Most of the studies dealing with control of heart rate (HR) suggested that increases in HR are more reliably obtained than decreases in HR (Engel & Chism 1967; Headrich, Feather, & Wells, 1971; Stephens, Harris, & Brady, 1972; Wells, 1972). Furthermore, studies indicated that the use of exteroceptive feedback, either audio or visual, is a necessary component of the biofeedback paradigm if cardiac control is to be learned (Blanchard, Young, & McLeod, 1972; Brener & Hothersall, 1967; Brener, Kleinman, & Goesling, 1969; Engel & Chism, 1967; Stephens, Harris, & Brady, 1972; Blanchard, Scott, Young & Edmundson, 1974; Harrison & Raskin, 1976). Blanchard and Young (1972), in their study of the relative efficacy of audio and visual feedback, found no statistical advantage for one sensory modality over the other.

Extroceptive Feedback

Three methods of sensory feedback have been employed in experiments related to cardiac control. Those are binary, proportional, and continuous wave-form. Binary, or augmented feedback involves comparing the interbeat intervals (IBI) of the heart, the reciprocal of HR, to some pre-set criterion on a beat by beat basis. After each comparison, S is automatically informed as to whether or not he/she has met or exceeded the criterion via an auditory mode (Brener, Kleinman, & Goesling, 1969), visual mode (Engel & Chism, 1967), or a combination of the two modes (Bergman & Johnson, 1972). Many of the studies utilizing binary feedback have demonstrated significant increases and decreases in HR (Bergman & Johnson, 1972; Brener, Kleinman & Goesling, 1969; Engel & Chism, 1967; Engel & Hansen, 1966).

The second method of presenting sensory feedback, proportional, provides S with direct knowledge of HR on a beat by beat basis (Blanchard & Young, 1972; Blanchard, Young, & McLeod, 1972; Finley, 1971). Proportional feedback can also be presented in an auditory or visual mode. Blanchard and Finley utilized the visual mode by using voltage meters on which baseline IBI was indicated as the mid-point on the meter; increases in HR were indicated by movement of the needle to the right of center and HR decreases were indicated by needle movements left of center. Utilization of the auditory mode has been demonstrated by Headrich et. al. (1971) where variations in tonal pitch informed the S of increases or decreases in HR. Proportional feedback differs from binary feedback in that the S is told not only if he/she is increasing/decreasing HR, but also by how much.

The third mode of presenting cardiac rate information is by continuous-wave form (Donelson, 1966; McDaniel, 1974). A feedback display of this type consists of an oscilloscope which is triggered to respond only to the high voltage R wave of the EKG wave complex. Usually an illuminated retilinear gradient is superimposed on the oscilloscope face and the distance between R wave spikes provides S with continuous wave-form feedback.

Instructional Sets

Bergman and Johnson (1971) have suggested that sensory feedback may not be a necessary prerequisite to learning self control of HR. Rather than provide Ss with exteroceptive feedback, they investigated the effects of instructional sets on cardiac control. Subjects were given the Mandler Autonomic Perception Questionnaire (APQ) as a pre-trial measure to determine their awareness of bodily autonomic functioning. On the basis of the scores Ss received on the APQ, they were divided into Low, Middle, and High awareness groups. Each group was then given instructions (verbal) to increase HR, then decrease HR, or instructions unrelated to HR. Middle APQ scorers displayed more control over HR which suggested that High scorers tended to overestimate autonomic responses whereas Low scorers tended to underestimate autonomic responses. Overall results indicated that exteroceptive feedback did not have to be presented in order for HR conditioning to occur.

Since Bergman and Johnson, other studies have suggested that exteroceptive feedback is not necessary to produce desired changes in HR. Levenson (1976) concluded that feedback was not necessary for HR control and that the addition of feedback produced no improvement in performance. Manuck, Levenson, Henrichsen, Gryll (1975) demonstrated significant bi-directional HR changes which did not support the hypothesis that feedback is necessary to obtain voluntary HR control. Blanchard, Young, Scott, &

Haynes (1974) found that 4 of 6 Ss showed an ability to increase HR on instructions alone in the absence of feedback. The consensus in biofeedback does produce greater HR changes than no feedback conditions. The above mentioned studies, however, do raise questions of whether feedback is necessary to produce desired changes in HR.

When taking HR measures, Stroufe (1971), has demonstrated the importance of monitoring respiration rate (RR) and respiration depth (RD). He found that RR affected only cardiac stability, faster breathing produced a more stable cardiac rate. RD, however, affected both HR level and variability. Deep breathing produced a faster, more variable HR, while shallow breathing produced a slower, more stable HR. Thus, it is important to either monitor RD and RR directly or give Ss instructions to not alter respiration patterns from normal.

Since self controlled changes in HR are desirable in the treatment of cardiac disorders, it was considered important to investigate some of the factors related to HR conditioning when dealing with awareness of autonomic functioning. The Mandler Autonomic Perception Questionnaire (APQ) has been used in studies as a pre-test measure of autonomic awareness (Mandler, Mander, & Uviller, 1958). In addition to the Bergman and Johnson study described earlier, which identified Ss best able to control HR, other investigators have also used the questionnaire as a pre-test measure of autonomic awareness. Blanchard, Young, and McLeod (1972) found persons less aware of autonomic activity better able to control HR, but their study did not include a middle awareness group. McFarland (1975) found no relationship between HR control and APQ scores. Thus, studies relating HR control and autonomic awareness have not demonstrated any conclusive evidence about how autonomic awareness affects one's ability to control HR.

The purpose of the present investigation was to test the following hypotheses:

1. Verbal instructions alone are as effective as exteroceptive feedback in achieving statistically significant increases and decreases in HR.

2. HR control increases with successive trials.

3. There are no sex differences in ability to control HR.

4. Middle APQ scorers are better able than High or Low APQ scorers to increase and decrease HR.

5. The APQ is an appropriate instrument to be used in identifying persons most capable of achieving HR control.

The present investigation adds to the current literature in that some studies perviously cited indicated that HR control is maximized by the utilization of exteroceptive, sensory feedback. In researching the literature, however, it has not been demonstrated conclusively that exteroceptive feedback provides a significant advantage over instructional sets in producing statistically significant HR changes. If evidence can be produced suggesting that cognitive feedback can be just as effective as sensory feedback, then time and expensive equipment can be eliminated from the treatment process. Thus, biofeedback as a treatment mode would become more efficacious in all clinical settings.

A second addition to the literature would be the demonstration of the APQ as a useful tool in identifying Ss who are most capable of altering HR.

Method

Subjects

Seventy-two Ss, 36 males and 36 females, were selected from 200 undergraduate students at Appalachian State University on the basis of scores received on the 5 questions related to HR activity on the Mandler Autonomic Perception Questionnaire. Twelve Ss, 6 males and 6 females classified as High (HA), Middle (MA), or Low (LA) scorers on autonomic awareness were randomly assigned to one of two feedback conditions (Feedback + Verbal Instructions or Verbal Instructions only) constituting twelve groups of six Ss each (see Appendix A).

Questionnaire

The pre-trial measure of autonomic awareness was the Mandler Autonomic Perception Questionnaire (APQ) (see Appendix D) which has been used in previous biofeedback research concerned with the relationship between autonomic awareness and control of HR. The Mandler APQ consists of 29 questions to which Ss respond by making a mark anywhere along a line anchored by a verbal description at either end. The scale is divided into equal segments so that a score for each item ranges from 0 to 9 with a high score indicating more awareness of function. Five of the 29 questions deal with awareness of heart activity. Mean scores from these 5 items (questions 9, 10, 11, 23, and 24) were used to assign Ss to High, Middle, and Low Awareness Groups. Ss in the upper third of the distribution were identified as HA, Ss in the middle third as MA, and SS in the lower third LA. Ss were then selected from the three groups and randomly assigned to the two feedback conditions.

Apparatus

The apparatus used in the experiment was the Vital I, made by the Meditron Instrument Corporation, which is a portable, lightweight, battery powered, digital display instrument that monitors and displays the human pulse rate in beats per minute. A readout of beats per minute is displayed every eighth heart beat on a bright red 7 segment .63 inch high display.

The apparatus comes with a finger clip which contains a sensor. The sensor that generates the signal contains a light source that reflects off the blood capillaries with each beat of the heart and is captured by a photo-sensor. This sensor generates a pulse each time it receives a strong reflection. The heart beats detected by the sensor in the finger clip are analyzed by a computing circuit and displayed in a digital fashion. The accuracy of the instrument is $\pm$ one heart beat per minute.

Ss sat in a comfortable chair and were verbally cued to increase HR, decrease Hr, or rest. E manually recorded the digital readouts of heartbeats per minute and time intervals were kept on a stopwatch.

Design

The experiment utilized a 3 X 2 X 2 X 3 mixed factorial design. The between S variables consisted of three levels of autonomic perception (HA, MA, and LA), two levels of feedback (sensory feedback + verbal instructions and verbal instructions only) two levels of sex (male and female), and three conditions of HR (increase, rest, decrease). The within S variable was 10 trials, each consisting of a 1 minute cue-on period followed by a 1 minute cue-off period (rest). There were 5 trials increasing HR and 5 trials decreasing HR. Increase and decrease cues were randomly ordered. A baseline HR was determined by computing a mean for the 3 minute baseline period and the nine 1 minute resting conditions (intertrial intervals).

The average HR per minute difference score between the increase/decrease conditions and the mean baseline HR for each trial constituted the dependent measure. RR and RD was monitored visually by E, but not recorded. Ss were instructed to breathe normally.

Procedure

Ss were brought individually into a private office which was dimly lighted and sound proofed against outside noises. They were seated in a comfortable fabric recliner. The index finger (2nd finger) on the right hand of each S was scrubbed with isopropanol and the fingerclip sensor of the Vital I was attached taking care that the sensor was secure over the curved fleshy portion of the finger between the first and second joints.

Ss were then given written instructions to decrease HR, increase HR, or rest when given the verbal cue to do so. The only difference between the instructions given to the feedback + instructions and the instructions only group was that the first group would be informed of their progress by a visual display that would give them an average HR per minute read-out every eighth heartbeat. The instructions were adapted from those used in a previous study by Bergman and Johnson (1971) (see Appendix). Ss in the feedback + instructions group were positioned to see the digital display, while the Vital I was positioned so that Ss in the no feedback condition could not see the visual display.

E sat behind the Ss during the experimental trials and recorded the average heartbeats per minute as they appeared on the Vital I. E also recorded time intervals with a stopwatch.

Results

The dependent measure employed in the present investigation was the difference score, in average heartbeats per minute, between increase/ decrease conditions and the mean baseline HR for each trial. The dependent variable results were analyzed in a 2 X 3 X 2 X 3 multivariate analysis of variance. The independent variables were feedback (Yes and No) Autonomic Perception Questionnaire scores (High, Middle, and Low Awareness of HR changes), and Sex (male and female). There were 3 levels of the dependent variable (increase, rest, and decrease).

The main effects of feedback, awareness, and sex were not significant. These results indicate that the independent variables had no relationship to the Ss ability to increase or decrease HR. The interactions between the independent variables were also found to be not significant. Table summaries of the analysis of variance are in Appendix A, Tables 1, 2, 3, and 4. Mean Scores for all groups are in Appendix B, Tables 5, 6, 7.

Discussion

Hypothesis number one which predicted that verbal instructions alone are as effective as exteroceptive feedback in achieving statistically significant increases and decreases in HR was not supported by the data. There were no differences in Ss ability to increase or decrease HR regardless of the beedfack condition. There was a trend in the predicted direction of increasing and decreasing but no difference in feedback conditions. This finding differs from most of the previous research which suggest that feedback enhances Ss ability to achieve significant changes in HR control, particularly increases in HR. One main different between the present investigation and previous studies was the length of each trial that Ss tried to

produce increases and decreases in HR. The trials in previous research were longer, 1 minute to 60 minutes, and there were multiple training sessions, whereas the trials in the present study were 1 minute trials. One minute is possibly too short a time period for Ss to effectively produce significant HR changes.

The second hypothesis which predicted that HR control is increased with successive trials was not supported by the data. There was a trend however in the predicted direction for decreasing trials. Ss inability to improve over trials is probably also related to the shortness of the trials.

Hypothesis 3, which predicted no sex differences in ability to increase and decrease HR was supported by the data. The sex variable has not been explored in previous research as the number of Ss in other research has been relatively small.

Hypothesis 4, which predicted that Middle APQ scores are better able than High or Low APQ scorers to increase and decrease HR, was not supported by the data. This finding was consistent with the data of McFarland (1975) who found no relationship between ability to control HR and APQ scores.

The final hypothesis which predicted that the Mandler Autonomic Awareness Questionnaire is an appropriate instrument to be used in identifying persons most capable of achieving HR control was not supported by the data. In the present investigation Ss were divided into High, Middle, and Low Awareness groups based on scores received on the 5 questions pertaining to HR awareness as opposed to the entire test of 29 questions, which cover other autonomic functions. The data suggested that Ss cannot be grouped according to autonomic awareness on the basis of the 5 questions pertaining only to HR. A look at the mean scores for the questions relating to HR and the mean scores for the total questionnaire (see Appendix B Tables 8 and 9) show that Ss assigned to the High Awareness group on the basis of their scores on the questions related to HR, did not score high enough on the total questionnaire to be grouped in the High Awareness group. The Middle and Low Awareness groups scored in the middle and low ranges on the total questionnaire which indicates that they were accurately identified by the 5 HR questions.

An hypothesis as to why the High Awareness group did not score high when the total questionnaire was considered is that these Ss may attend so highly to changes in HR activity when under stress, that they do not recognize changes in other parts of the autonomic nervous system. It is highly unlikely that only one autonomic system, such as HR, is effected under stress. The reason that Ss attend specifically to changes in HR is probably because of the associations of fear, nervousness, and anxiousness with changes in HR activity.

Some individual Ss were able to produce increase or decreases in HR that were greater than 5 hearbeats difference from the resting condition (Appendix B Table 10). The greatest changes were in the increasing direction. There were no identifiable difference in these individuals. This particular finding suggests the need for some type of personal history data to be collected from Ss prior to the study to rule out the possibility of contaminating the study with Ss trained in self hypnosis, relaxation training, yoga, or some other form of training that would facilitate control of the autonomic nervous system. These data were not recorded in the present investigation.

Other variables not considered in the present investigation were time since last meal or snack, smoking and consumption of alcohol. It is possible that these variables confounded the results since there is a direct physiological response by the autonomic nervous system to eating, drinking, and smoking behavior. These variables need to be controlled via per-experimental instructions to Ss.

The major design problem with the present investigation was the inability of E to control RR and RD by pacing or statistical methods. There was no equipment available to monitor these two important respiratory patterns that were discussed earlier.

The use of the Vital I is also questionable since it is sensitive to slight hand movements. The major drawback in using the Vital I is that it is virtually impossible for Ss to move around to get themselves more comfortable. Therefore, if Ss become uncomfortable they may attend to being uncomfortable rather than concentrating on control of HR.

Several implications for further research are suggested from this study. A similar study needs to be conducted that would increase the length of each trial, preferably to at least 5 minutes, and the total number of trails to a minimum of 10 for each condition. Other areas to investigate are uses of other questionnaires to measure autonomic awareness and its relationship to ability to control HR. Studies of HR control need to be conducted comparing the ability of Ss trained in meditation, yoga, and other forms of self-hypnosis or relaxation to Ss who have no training. A final interesting area to explore would be the types of thoughts individual Ss use to control certain autonomic responses since there was evidence in the present investigation that indicated some Ss were able to achieve fairly large bidirectional changes in HR.

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APPENDIX A

Experimental Design

Mandler Autonomic Perception Questionnaire (5 items)

FEEDBACK CONDITION	H	M	L
F+VI	N = 12 (6 male, 6 female)	N = 12 (6 male, 6 female)	N = 12 (6 male, 6 female)
VI	N = 12 (6 male, 6 female)	N = 12 (6 male, 6 female)	N - 12 (6 male, 6 female)

APPENDIX B

Table 1

Analysis of Variance for Increasing Trials

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Feedback	12.469	1	12.469	0.116	0.999
Autonomic Awareness	122.948	2	61.474	0.572	0.999
Sex	8.846	1	8.846	0.082	0.999
2-Way Interactions	209.419	5	41.884	0.390	0.999
Feedback X Autonomic Awareness	117.143	2	58.572	0.545	0.999
Feedback X Sex	87.925	1	87.925	0.818	0.999
Autonomic Awareness X Sex	4.351	2	2.176	0.020	0.999
3-Way Interactions	232.306	2	116.153	1.080	0.347
Feedback X Autonomic Awareness X Sex	232.306	2	116.153	1.080	0.347
Explained	585.988	11	53.272	0.496	0.999
Residual	6450.328	60	107.505		
TOTAL	7036.316	71	99.103		

Table 2

Analysis of Variance for Resting Trials

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Main Effects	83.941	4	20.985	0.206	0.999
Feedback	3.264	1	3.264	0.032	0.999
Autonomic Awareness	73.789	2	36.894	0.363	0.999
Sex	6.888	1	6.888	0.068	0.999
2-Way Interactions	146.989	5	29.398	0.289	0.999
Feedback X Autonomic Awareness	81.096	2	40.548	0.399	0.999
Feedback X Sex	52.827	1	52.827	0.519	0.999
Autonomic Awareness X Sex	13.066	2	6.533	0.064	0.999
3-Way Interactions	234.906	2	117.453	1.154	0.322
Feedback X Autonomic Awareness X Sex	234.906	2	117.453	1.154	0.322
Explained	465.836	11	42.349	0.416	0.999
Residual	6104.395	60	101.740		
TOTAL	6570.230	71	92.538		

Table 3

Analysis of Variance for Decreasing Condition

Source of Variation	Sum of Squares	DF	Mean Square	F	Significance of F
Main Effects	63.952	4	15.988	0.159	0.999
Feedback	1.067	1	1.067	0.011	0.999
Autonomic Awareness	60.178	2	30.089	0.299	0.999
Sex	2.708	1	2.708	0.027	0.999
2-Way Interactions	115.884	5	23.177	0.230	0.999
Feedback X Autonomic Awareness	94.779	2	47.389	0.471	0.999
Feedback X Sex	18.369	1	18.369	0.182	0.999
Autonomic Awareness X Sex	2.736	2	1.368	0.014	0.999
3-Way Interactions	171.292	2	85.646	0.851	0.999
Feedback X Autonomic Awareness X Sex	171.292	2	85.646	0.851	0.999
Explained	351.129	11	31.921	0.317	
Residual	6040.109	60	100.668		
TOTAL	6391.238	71	90.017		

Table 4

Analysis of Variance for all S Levels of Dependent Variable

Source of Variance	Sum of Squares	DF	Mean Square	F	Significance of F
Mean	1346002.78241	1	1346002.78241	4419.79	0.0000
Feedback	2.89352	1	2.89352	0.01	0.9227
Autonomic Awareness	249.37037	2	124.68519	0.41	0.6659
Sex	0.78241	1	0.78241	0.00	0.9597
Feedback X Autonomic Awareness	291.14815	2	145.57407	0.48	0.6224
Feedback X Sex	155.04167	1	155.04167	0.51	0.4783
Autonomic Awareness X Sex	15.81481	2	7.90741	0.03	0.9744
Feedback X Autonomic Awareness X Sex	634.11111	2	317.05556	1.04	0.3594
Error	18272.38889	60	304.53981		

APPENDIX C

Table 5

Mean Scores: Increase Condition

Variable	Code	Mean
TOTAL SS		80.3609
FB	1	80.778
AR	1	82.783
SX	1	81.367
SX	2	84.200
AR	2	82.083
SX	1	85.500
SX	2	78.667
AR	3	77.467
SX	1	77.733
SX	2	77.200
FB	2	79.944
AR	1	78.783
SX	1	79.267
SX	2	78.300
AR	2	81.333
SX	1	77.900
SX	2	84.767
AR	3	79.717
SX	1	78.300
SX	2	81.133

(FB) Feedback 1=Yes 2=No (AR) Autonomic Awareness 1=High 2=Middle 3=Low (SX) Sex 1=Male 2=Female

Table 6

Mean Scores: Resting Condition

Variable	Code	Mean
TOTAL SS		78.7568
FB	1	78.544
AR	1	80.883
SX	1	79.250
SX	2	82.517
AR	2	78.525
SX	1	82.350
SX	2	74.700
AR	3	76.225
SX	1	77.533
SX	2	74.917
FB	2	78.969
AR	1	78.325
SX	1	79.483
SX	2	77.167
AR	2	80.142
SX	1	77.917
SX	2	82.367
AR	3	78.442
SX	1	77.867
SX	2	79.017

(FB) Feedback 1=Yes 2=No (AR) Autonomic Awareness 1=High 2=Middle 3=Low (SX) Sex 1=Male 2=Female

Table 7

Mean Scores: Decrease Condition

Variable	Code	Mean
TOTAL SS		77.6665
FB	1	77.789
AR	1	79.683
SX	1	78.233
SX	2	81.133
AR	2	78.533
SX	1	81.333
SX	2	75.733
AR	3	75.150
SX	1	75.900
SX	2	74.400
FB	2	77.544
AR	1	76.550
SX	1	77.933
SX	2	75.167
AR	2	78.450
SX	1	76.533
SX	2	80.367
AR	3	77.633
SX	1	77.233
SX	2	78.033

(FB) Feedback 1=Yes, 2=No (AR) Autonomic Awareness 1=High, 2=Middle, 3=Low (SX) Sex 1=Male, 2=Female

Table 8

Mean Scores: Mandler Autonomic Perception Questionnaire

Variable	Code	Mean
TOTAL SS		43.6944
FB	1	43.500
AR	1	53.917
SX	1	48.667
SX	2	59.167
AR	2	45.083
SX	1	38.833
SX	2	51.333
AR	3	31.500
SX	1	26.833
SX	2	36.167
FB	2	43.889
AR	1	48.250
SX	1	49.167
SX	2	47.333
AR	2	48.917
SX	1	47.833
SX	2	50.000
AR	3	34.500
SX	1	33.667
SX	2	35.333

(FB) Feedback 1=Yes, 2=No (AR) Autonomic Awareness 1=High, 2=Middle, 3=Low (SX) Sex 1=Male, 2=Female

Table 9

Mean Scores: 5 Heart Rate Questions on Mandler Autonomic Questionnaire

Variable	Code	Mean
TOTAL SS		49.500
FB	1	48.861
AR	1	72.917
SX	1	71.167
SX	2	74.667
AR	2	49.250
SX	1	47.333
SX	2	51.167
AR	3	24.417
SX	1	26.167
SX	2	22.667
FB	2	50.139
AR	1	73.917
SX	1	71.167
SX	2	76.667
AR	2	53.917
SX	1	53.500
SX	2	54.333
AR	3	22.583
SX	1	23.500
SX	2	21.667

(FB) Feedback 1=Yes, 2=No (AR) Autonomic Awareness 1=High, 2=Middle, 3=Low (SX) Sex 1=Male, 2=Female

Appendix D
Table 10

Mean Scores: Individual Ss on Increase, Resting, Decreasing Conditions

S#	Increase	Rest	Decrease
1	69	69	69
2	78	78	76
* 3	71	63	63
* 4	83	85	79
5	87	85	83
6	82	83	81
7	112	108	104
8	67	66	65
9	90	86	83
*10	96	90	84
11	72	75	76
12	72	70	70
13	80	77	77
14	73	71	68
15	87	83	85
16	84	85	83
17	85	83	81
18	77	76	74
19	78	77	75
20	79	80	77
21	74	74	74
22	92	93	91
23	79	78	77
24	74	75	73
25	93	91	88

*Ss able to increase or decrease HR > 5 Heartbeats.

Table 10 (Cont.)

S#	Increase	Rest	Decrease
26	77	76	77
27	75	76	72
28	87	87	88
29	51	52	52
30	84	86	82
31	77	76	75
32	85	83	84
33	75	77	74
34	79	78	76
35	79	78	80
36	75	75	74
37	98	94	93
38	80	77	77
39	72	70	68
40	86	86	83
41	78	78	77
42	91	91	88
43	63	61	62
44	85	83	90
*45	85	79	81
46	86	80	77
*47	83	78	79
48	70	67	64
49	68	66	69
50	57	57	56

*Ss able to increase or decrease HR > 5 Heartbeats.

Table 10 (Cont.)

S#	Increase	Rest	Decrease
51	94	92	90
*52	76	68	66
53	94	92	92
54	75	75	73
55	71	69	69
56	82	79	77
*57	91	83	83
58	86	89	84
59	76	76	75
60	83	81	82
*61	82	71	68
62	87	84	81
63	71	70	70
64	102	102	103
65	84	80	79
66	88	87	87
67	64	64	63
68	79	77	77
69	78	78	76
70	93	92	92
71	75	76	74
72	77	77	74

*Ss able to increase or decrease HR > 5 Heartbeats.

APPENDIX E

Mandler Autonomic Perception Questionnaire

For each question there is a line or scale on the ends of which are statements of extreme feelings or attitudes. You are required to put a mark (X) on that point on the line which you think best indicates the state of your feeling or attitude about the particular question. You may put the mark anywhere on the line. Please read each question in each scale very carefully. You will have ample time to consider each question at length.

You may find if difficult to answer some of these questions. This is because people differ widely in their emotional experiences. It is this variation in individual experiences which we are trying to assess. Therefore, it is extremely important that you give as much thought as possible to each of your answers. When you find it difficult to mark a particular scale, use your best possible estimate of how you might feel.

There are no catch questions in this questionnaire. Its success depends entirely upon your cooperation.

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER. REMEMBER, YOU MAY PUT THE MARK ANYWHERE ON THE LINE.

1. When you feel anxious, are you aware of many bodily reactions?

   9 ________________________________ 0
   Aware of very many — Aware of very few

2. When you feel anxious, how often are you aware of your bodily reactions?

   9 ________________________________ 0
   Always — Never

3. When you feel anxious, does your face become hot?

   0 ________________________________ 9
   Does not change — Becomes very hot

4. When you feel anxious, do your hands become cold?

   0 ________________________________ 9
   No change — Very cold

5. When you feel anxious, do you perspire?

   9 ________________________________ 0
   A great deal — Not at all

6. When you feel anxious, does your mouth become dry?

   9 ________________________________ 0
   Always — Never

7. When you feel anxious, are you aware of increased muscle tension?

   0 ________________________________ 9
   No increased tension — A great deal of tension

8. When you feel anxious, do you get a headache?

   9 ________________________________ 0
   Always — Never

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER. REMEMBER, YOU MAY PUT THE MARK ANYWHERE ON THE LINE.

9. When you feel anxious, how often are you aware of any change in your heart action?

0 ______________________________ 9
Never — Always

10. When you feel anxious, do you experience accelerated heart beat?

0 ______________________________ 9
No change — Great acceleration

11. When you feel anxious, does the intensity of your heart beat increase?

0 ______________________________ 9
Does not change — Increases to extreme pounding

12. When you feel anxious, how often are you aware of change in your breathing?

9 ______________________________ 0
Always — Never

13. When you feel anxious, does your breathing become more rapid?

0 ______________________________ 9
No change — Very rapid

14. When you feel anxious, do you breathe more deeply?

9 ______________________________ 0
Much more deeply — No change

15. When you feel anxious, do you breathe more shallowly?

9 ______________________________ 0
Much more shallowly — No change

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER. REMEMBER, YOU MAY PUT THE MARK ANYWHERE ON THE LINE.

16. When you feel anxious, do you feel as if blood rushes to your head?

9 ______________________________ 0
Always — Never

17. When you feel anxious, do you get a lump in your throat or a choked-up feeling?

9 ______________________________ 0
Always — Never

18. When you feel anxious, does your stomach get upset?

0 ______________________________ 9
Not at all — Very upset

19. When you feel anxious, do you get a sinking or heavy feeling in your stomach?

0 ______________________________ 9
Never — Always

20. When you feel anxious, do you have any difficulty talking?

0 ______________________________ 9
Never — Always

21. When you feel anxious, are you bothered by your bodily reactions?

9 ______________________________ 0
Bothered very much — Not bothered at all

22. When you feel happy, are you aware of many bodily reactions?

9 ______________________________ 0
Aware of very many — Aware of very few

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER. REMEMBER, YOU MAY PUT THE MARK ANYWHERE ON THE LINE.

23. When you feel happy are you aware of any change in your heart action?

9 ______________________________ 0
Always — Never

24. When you feel happy, do you experience accelerated heart beat?

0 ______________________________ 9
No change — Great acceleration

25. When you feel happy, does your face become hot?

0 ______________________________ 9
Does not change — Becomes very hot

26. When you feel happy, do you ever feel week or shaky?

9 ______________________________ 0
Always — Never

27. When you feel happy, do you get a lump in your throat or a choked-up feeling?

9 ______________________________ 0
Always — Never

28. When you feel happy, do you have difficulty talking?

0 ______________________________ 9
Never — Always

29. Do you think in general that this type of questionnaire is valuable in appraising individual differences in emotional experiences?

9 ______________________________ 0
Very valuable — Not very valuable

THINK ABOUT EACH QUESTION CAREFULLY BEFORE YOU ANSWER. REMEMBER, YOU MAY PUT THE MARK ANYWHERE ON THE LINE.

30. How adequately do you think that the preceding questions have elicited a picture of your own emotional experiences?

9 ______________________________ 0
Very adequately — Very inadequately

APPENDIX F

Instructions to Increase and Decrease HR

Feedback Group

This study deals with controlling your heart rate. Some people can increase or decrease their heart rate when given a signal to do so. Controlling your heart rate is possible if you concentrate on your heart and try very hard to make your heart rate faster or slower. In this experiment, you will be given a verbal cue by the experimenter to either increase or decrease your heart rate. When given the cue, I want you to try and make your heart go faster or slower, depending on the cue given. There will be a number of verbal cues to either increase or decrease your heart rate. You can monitor your progress by looking at the digital display instrument in front of you which will periodically give you an average heart beats per minute readout. After each verbal cue to increase or decrease your heart rate, you will hear the verbal cue to rest. During the rest period, I want you to stop trying to change your heart rate and relax until given another cue to increase or decrease. You will notice that as the experiment progresses, your ability to control your heart rate will improve with each successive trial. Please do not alter your breathing from normal. Do you have any questions before we begin? There will be a 3 minute adaptation period before we actually begin.

Instructions to Increase and Decrease HR

No Feedback Group

This study deals with controlling your heart rate. Some people can increase or decrease their heart rate when given a signal to do so. Controlling your heart rate is possible if you concentrate on your heart and try very hard to make your heart fate faster or slower. In this experiment, you will be given a verbal cue by the experimenter to either increase or decrease your heart rate. When given the cue, I want you to try and make your heart go faster or slower, depending on the cue given. There will be a number of verbal cues to either increase or decrease your heart rate. After each verbal cue to increase or decrease your heart rate, you will hear the verbal cue to rest. During the rest period, I want you to stop trying to change your heart rate and relax until given another cue to increase or decrease. You will notice that as the experiment progresses, your ability to control your heart rate will improve with each successive trial. Please do not alter your breathing from normal. Do you have any questions before we begin? There will be a 3 minute adaptation period before we actually begin.